# ADMINISTRATION REPORT

OF THE 133349

PUBLIC WORKS DEPARTMENT,

(BUILDINGS AND ROADS BRANCH,)

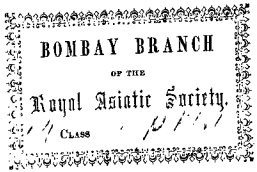
BOMBAY PRESIDENCY,

FOR THE YEAR

**1880-81.**

PRINTED AT THE GOVERNMENT CENTRAL PRESS.

1881.

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on 11 July 2017

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# PUBLIC WORKS DEPARTMENT, BOMBAY,

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FOR THE YEAR 1880-81.

## GENERAL REMARKS.

1. The works under execution during the year call for no special remark. Owing to restricted grants, the progress made with the important class—Provincial Works—including the whole system of Communications throughout the Presidency, was not as great as could have been wished, but in future years improvement in this respect may be looked for.

| *In India.* | | Rs. |
|---|---|---|
| Imperial ... ... ... | | 17,57,572 |
| Provincial. { Other Public Works. | | 24,18,990 |
| Railways ... ... | | 18,538 |
| Contributions ... ... | | 2,36,436 |
| Local Funds ... ... | | 19,22,276 |
| Local Loans ... ... | | 16,062 |
| | Total | ... 63,69,844 |
| In England ... ... ... | | 32,011 |
| | Grand Total | ... 64,01,855 |

2. Under Imperial the large provision made in the Budget for works in connection with the landing of troops at the Prince's Dock, Bombay, was re-appropriated to other works pending the decision of the question of the advisability of utilizing the Sassoon Dock for the purpose in preference.

3. The entire expenditure of the year was Rs. 64,01,855 as per margin. The expenditure in India was Rs. 63,69,844. In round figures the expenditure on New Works was 23¼ lakhs; on Repairs 26¼ lakhs; on Establishment 12 lakhs; Tools and Plant ½ lakh, and on Barrack Department, chargeable to Military Grant, 1¼ lakhs.

## I.—MILITARY.

4. The entire expenditure under the head Military was Rs. 14,47,123, of which Rs. 5,46,967 was for Original Works, and Rs. 4,45,377 for Repairs; the balance being for Establishment (Rs. 2,76,100), Tools and Plant (Rs. 17,595), Profit and Loss (Rs. 15), and Barrack Department (Rs. 1,61,069).

### I.—FORTIFICATIONS.

5. The protection of a portion of Manora Point at the entrance of Karáchi Harbour in connection with the existing batteries and proposed fort was in progress. The protection work is practically complete, and that portion executed in previous seasons stood well and fulfilled its purpose satisfactorily; but the sloping and pitching of the cliff above the concrete blocks, a work of defence, was suspended pending the preparation of a revised design with perpendicular scarp wall.

6. At Aden the magazines in connection with the defences were improved by the addition of proper floors, copper fastenings, and by more perfect arrangements for ventilation. A subsidiary guard-room of permanent construction for the Western Gate, Isthmus Position, was completed.

7. A survey with borings was made of the shoal known as the 20-feet patch at the entrance of Bombay Harbour with a view of determining its suitability as a site for a fort. The foundation was ascertained to be favorable, and the result was reported to the Government of India for the information of the Defence Committee. An additional store-room of semi-permanent construction for the Oyster Rock Battery within the Harbour was completed, and the buildings and works at Butcher's Island in connection with the Submarine

Mining Defences were finished, with the exception of a few minor items. Examining sheds were erected as adjuncts to the powder magazines at Sewri and Rowli, in the Island of Bombay.

## II.—CANTONMENTS.

8. Under this head the only work of importance in progress was the drainage of the ground in the vicinity of the barracks occupied by British troops at Ahmedabad. The project which was drawn up in consultation with the Senior Medical Officer of the station embraced the excavation of drainage cuts for surface drainage and the raising and consolidation of the ground in the immediate neighbourhood of the buildings to prevent water lodging there. The work was completed during the year.

9. Some tree-planting was done in the vicinity of barracks, &c., at Colába.

10. A system of subsoil drainage for the officers' lines at Ghorpuri, Poona, was completed during the year. These lines are situated on black cotton soil, and it was doubtful how far subsoil drainage would answer in such a soil; an experiment was accordingly made in the first instance in 1878, and after the experience of two monsoons the drains were found to act efficiently; the drains consist of earthenware pipes bedded in a porous packing of sand laid with a good fall in trenches 3 feet deep: the drains discharge into a water-course or nála to the eastward of the lines.

## III.—ACCOMMODATION FOR TROOPS.

11. No large projects of this class were in progress during the year, and operations were restricted to the provision of several necessary buildings in various parts of the Presidency.

12. The work of enlarging the Military prison at Poona by the addition of two blocks, each containing 25 cells, was let by contract and made considerable progress. At the same station an armourer's shop of the standard design was completed in the Ghorpuri lines; the Canteen in the Wanowrie lines is to be enlarged to afford improved accommodation for the men, and the necessary alterations for effecting this purpose were commenced. At the Sanitarium of Purandhar, in the Poona district, a building of permanent construction was completed, including an orderly-room, guard-room and a lockup-room for prisoners, and the hospital, which is on an exposed site, was re-roofed.

13. At Colába a new armourer's shop for British Infantry was commenced on the standard plan; the gymnasium at Morley Hall was covered in for the protection of the apparatus and to admit of its being used at all seasons and at all times of the day; and the station hospital was altered and improved, the surgery and dispensary having been enlarged.

14. The Canteens for the Royal Artillery and British Infantry at Baroda were enlarged and the ventilation improved.

15. At Ahmedabad the N. I. Hospital, quarter and rear guard-rooms were re-floored with asphalt laid on concrete beds, and half-panelled and half-glazed doors and new glazed windows were substituted for the old planked ones.

16. At Deválí a new bázár guard-room and certain alterations to the mess-house—works which were suspended in 1879-80 under orders for the restriction of public works expenditure—were completed; three cells were added to the quarter guard, and the work of improving the troop siding, platform and shed for the depôt barracks was in progress.

17. At Belgaum a building was purchased and adapted for the purpose of a lock-hospital.

18. At Steamer Point, Aden, two semi-permanent bungalows, each consisting of three rooms with verandah, bath-rooms, &c., and out-houses were erected for officers; a large building to serve as theatre and recreation-room with galleries, dressing and retiring and property rooms was almost completed: the work is of a permanent character, and is estimated to cost Rs. 36,710. At the Crater, Aden, the Military prison was enlarged by the addition of a new guard-room and a block of four cells, the old guard-room having been converted into an additional cell and store-room: to this work the Admiralty contributed £1,000 (Rs. 11,623).

19. At Hyderabad, Sind, the Native Infantry lines, which are in the charge of this Department, and consist of 12 Native Officers' quarters and 36 pendalls, were renewed and re-roofed at a cost of Rs. 21,117.

## IV.—ORDNANCE.

20. The Arsenals at Bombay and Karáchi were under improvement during the year. In the case of the Grand Arsenal, Bombay, the works comprise the enlargement of, and addition of upper stories to, two laboratory buildings to accommodate Ordnance stores, the addition of an upper story to one of the gun-sheds for storing tools, intrenching and Ordnance stores, and the erection of a Browning moulders' and sawyers' shed; the work made considerable progress, but is not yet complete. At Karáchi the alterations included the construction of an engine-house and fuel-shed, and adapting a portion of the iron framed store building as a workshop to receive the labor-saving machinery ordered from England.

21. A dispense magazine on the standard plan was constructed at Surat in the vicinity of the lines, ammunition having hitherto been kept at the Castle which is about 1½ miles distant. At Devláli a similar magazine commenced in the previous year was in progress.

22. At the Kirkee Powder-works the barrel making machinery was slightly improved, and a corrugated iron covering was added to the canvas roof over the saltpetre refinery.

23. A new permanent guard-room was constructed above the existing guard-room near the Arsenal Magazine at the Isthmus, Aden.

### V.—COMMISSARIAT.

24. Works of this class are of local interest only, and it will suffice to mention those that were in progress during the year. These included a shed with store and mule and bullock equipment rooms and the re-roofing of the Commissariat store at the Crater, Aden, which were completed, and quarters for the Engineer in charge of the Seera Condenser, which was nearly completed; new bakeries for European troops at Baroda and Ahmedabad and additions to the bakery at Karáchi; at Belgaum a slaughter-house and cattle-shed were built and a new Commissariat office and store building were completed at Málegaon; at Poona a new permanent office was completed, and also a large open shed for the protection of wheeled carriages in the cattle lines; at Karáchi a new slaughter-yard and cattle-shed were commenced, but work was suspended as exception was taken to the site, and the project has since been abandoned in favour of a proposal to improve the existing yard.

### VII.—STAFF.

25. A shed 322'½ × 13' with corrugated iron roofing has been erected in the Barrack Store-yard at Poona, and the latter enclosed by a masonry wall.

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## II.—CIVIL BUILDINGS.

26. The expenditure under this head was Rs. 14,08,114, Rs. 6,59,903 being for Original Works, and Rs. 4,28,307 for Repairs; the balance being for Establishment (Rs. 3,10,353) and Tools and Plant (Rs. 9,551).

### I.—REVENUE.

27. The following works were undertaken during the year under review in connection with the Salt Department:—Six new Salt Chaukis (Police Posts), the walls and flooring of which are of teak and the roof of corrugated iron, each to accommodate two peons giving each a room 6' × 10' at Mátunga, Bombay; a building of coursed stone and lime masonry with Mangalore tiled roof for the office of Sarkárkún (Custom's Officer) at Pen in the Thána Collectorate; a building of similar construction to accommodate a guard of two Havaldárs and six Constables for the protection of the Sarkárkún's treasury at Trombay in the same Collectorate; a bungalow with out-houses for the Sarkárkún in charge of the Saltworks at Sanikutta in the Kánara Collectorate; a masonry cistern for the collection of water from the springs in the neighbouring wells at Dháravi and cast-iron pipes thence to Rymoordha, a distance of 1¾ miles, with a view of supplying water to the salt establishment at the latter place.

28. The old District Officer's bungalow at Kalyan being in a very bad state of repair and inconveniently situated, was sold for Rs. 2,225, and a new stone and lime masonry house, consisting of five rooms with servants' quarters and stabling, was constructed.

29. The head-quarter's distillery at Sholápur erected by the Abkari Contractor under agreement with Government was taken over at a valuation from the contractor, and it is being enclosed by a wire fence. A similar building at Sátára was likewise taken over by Government from the contractor.

30. Owing to the insufficiency and faultiness of the existing accommodation in the Collector's Kacheri at Poona, extensive additions and alterations have been effected to it.

31. The foundations and superstructure of the Kacheri for the Málatdár (chief subordinate revenue and magisterial officer) at Chopda, in the Khándesh Collectorate, were put in; a similar building at Devrukh in the Ratnágiri Collectorate has nearly been completed. These buildings are on the standard plan and comprise accommodation for office, treasury, guard, records, and Sub-Registrar's office, lock-ups, Fauzdár's (Police Inspector) office, &c. The Mukhtyarkarate at Sujával, affording accommodation for the Mukhtyarkar (chief local subordinate revenue and magisterial officer) and Sub-Registrar's treasury and record-room, with court-yards for prisoners, was completed during the year.

## II.—POST OFFICE.

32. The only works executed under this head during the year were the quarters for Post Office servants at Steamer Point, Aden, a new Post Office at Karád, and certain additions to the Post Office, Bombay.

## III.—TELEGRAPH.

33. The building for the sub-marine cable-making machine of the Persian Gulf Telegraph at Manora, which was commenced last year, has been completed.

## IV.—GENERAL BUILDINGS.

34. Under this head the works executed comprised the erection of four dispense rooms, two on the ground and two on the upper floors, a screen of galvanised corrugated iron for *post-mortem* examination, and removal of old and replacement of new roof to certain portions of the male ward in the European General Hospital, Bombay; fitting up a shed as a laboratory in the Medical Stores Premises, Byculla, Bombay; additions and alterations to the staff bungalow, additions and alterations to the stables, &c., and fitting up a Turkish Bath and making a riding path in the Park, Government House, Parel; sanitary improvements to the New Secretariat, Bombay; additions and alterations to the Government Central Press; adding an upper story in the David Sassoon Industrial and Reformatory Institution, Bombay; extensive additions and alterations to the Mint at Bombay; additional accommodation at Godhra for the Rewa Kántha Agency; additions and alterations to the Addlat Wáda at Sátára to fit it for the residence of Sardár Rajaram Bhoslay; a new coach-house and stables for the Government House at Mahábaleshwar; two blocks of buildings each containing 18 rooms or quarters for syces and a shed 285′×38½′ for the horses of the Body-Guard of His Excellency the Governor at Awand; additions and alterations to the harness-rooms and stables and a new summer house at Government House, Ganesh Khind; removal of the staff bungalow from outside the south entrance gate to a knoll on the north side of the same Government House; dispensaries with subsidiary buildings at Sangamner, Modáss, Shindgi and Olpád.

## V.—ECCLESIASTICAL.

35. There were only two works in progress under this head during the year under review (1) a Church at Malabar Hill, Bombay, designed in the early English Gothic style to accommodate 100 persons, and estimated to cost Rs. 13,608; the building is being constructed from private contributions supplemented by a grant-in-aid of Rs. 5,000 from Government; and (2) a Church capable of seating 207 persons in the Camp at Ahmedabad for the accommodation of the garrison.

## VI.—EDUCATIONAL.

36. The Elphinstone High School was completed and handed over to the Educational Department, and furniture for it of the value of Rs. 7,688 is being supplied at the cost of that Department.

37. A little before the close of the year a Gothic building of semi-permanent construction was designed and commenced on the site of the old school for the accommodation of the Superintendent and Teacher of the School of Art, Bombay; it being desirable that these officers should reside near the school. The quarters comprise two drawing rooms, each 18′×18′, two dispense rooms, each 6′×4′-11″, two dining rooms, each 18′×18′, with out-houses for both officers, and are estimated to cost Rs. 30,093. Rent will be recovered from each at the rate of Rs. 100 per mensem. The foundations of a store-room for the same school have been put in, and several small additions and alterations to the school itself are to be carried out, but of these only one item, viz., the substitution of plate for ground glass for some windows, has been executed during the year.

38. The Alexandra Native Girls' English Institution noticed in last year's report is approaching completion, and the ground floor was nearly ready for occupation at the end of the year.

39. The University Library and Clock Tower (Rájábái) at Bombay remains incomplete pending the arrival from England of the clock and chimes.

40. The ground and first floors of the west wing and central feature of the Cathedral High School were completed, and the second floor is in progress. This building occupies one of the best sites in Bombay, and its architectural features have been designed accordingly; but the addition of the east wing is necessary to complete the design architecturally; this has been deferred for want of funds and until the school attains the status of a college.

41. The John Connon High School is nearly completed, the ground and first floors having been already occupied.

42. At Sháhápur the school-house has been enlarged to accommodate 125 boys instead of 75. Work had to be suspended on the new school-house at Mahád noticed in last year's

report to allow of alteration being made in the project for a larger school for 350 boys instead of for 150.

43. The Byramjee Jeejeebhoy Medical School at Ahmedabad was noticed in last year's report as having been estimated to cost Rs. 35,301, of which a sum of Rs. 20,000, exclusive of interest, has been contributed by Mr. Byramjee Jeejeebhoy, C.S.I. It is to consist of a lecture and dissecting room, a dead-house, sitting and refreshment rooms for pupils, latrines, and an enclosure wall with gates. The work was commenced in April 1866 and is approaching completion.

44. The school-houses at Retra Budrukh and Dudgaon in Sátára were completed.

45. The foundry at the workshop of the College of Science at Poona has been enlarged so as to afford increased accommodation therein.

46. The school-houses at Dhulia and Dharangaon in Khándesh were completed and handed over for occupation. In the Dhárwár Collectorate school-houses have been built at Hángal and Chickerúr, and others are in progress at Byadgi, Gadag, Herikerúr, Upinbetgeri and Ránebennur. In the Kaládgi District the school-houses at Tálikot, Nalatwad and Mangoli were completed, and that at Bágalkot was in progress.

## VII.—JUDICIAL.

47. At Aden a dispensary, hospital, ward and office of the Jail were built. Police lines consisting of two blocks to accommodate twenty men each, were erected at Kaira, and quarters for the Superintendent of Police at that station nearly completed. At Khárághoda Police lines with lock-ups were erected. A project for Police lines at Dholka was prepared, but, owing to changes in the selection of the site for these lines, as well as delay in the approval of the same, nothing beyond collecting materials was done during the year.

48. In the Deccan Central Jail a front and rear guard-rooms with double gates were provided, and the distribution of the water-supply within the walls of the Jail was nearly completed.

49. Police lines and residence and office for the Chief Constable at Camp Devláli, the former to accommodate two Head Constables and twelve Constables, were built during the year.

50. The Subordinate Judge's Court-house at Devrukh, which was mentioned in the last year's report as having been commenced, was all but completed.

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# IV.—COMMUNICATIONS.

51. The total outlay on Communications, including Roads, Bridges, and Accommodation for Travellers, was Rs. 29,82,196, of which Rs. 8,00,142 was for Original Works, and Rs. 16,52,872 for Repairs; the remainder being for Establishment (Rs. 5,10,564) and Tools and Plant (Rs. 18,618).

52. The works executed for the improvement of communications in the Presidency extended over a large area and consisted of various items, the particulars of which are given in the Financial Accounts and consequently need not be recapitulated here; but the following is a concise description of the more important works carried out in each district.

## I.—ROADS.

53. **Northern Konkan.**—A road 13¼ miles long from Dharamtar (to which a steam ferry plies daily from Bombay) to Nágothna connecting the main road from Nágothna to Poladpur, and thence the general system of roads in the Deccan and Southern Maratha Country *viâ* the Varandha and Fitzgerald ghâts with the Dharamtar and Campoolie road extending *viâ* the Bhor Ghát to Poona was commenced in 1864-65, but owing to want of funds its further progress was stopped; it has again been taken in hand and is being completed without metal and kerbing. Another important line is the road from the Dáhánu Railway Station, on the B. B. & C. I. Railway, to the town of Jawhár, in the Native State of that name. This road has a total length of 36½ miles, of which 14 are in British territory and 22½ in the Jawhár State, and it is proposed to ultimately extend it to give through communication between Násik *viâ* Jawhár and the coast. The road was commenced in 1870, and two ghâts were completed at a cost of Rs. 84,300 met by the State funds. Provision for the portion in British territory was made in the Budget for 1880-81, but the work was suspended pending an arrangement being come to with the Rája of Jawhár regarding the levy of transit dues on a part of the road passing through an outlying portion of his territory. This matter has since been settled, and the project for the road is being revised under an agreement come

to with the Rája. The road over the Karli Khind and the Murbád-Savalgaon section of the road from Kalyán to the Málsejghát have been completed, with the exception of spreading and consolidating metal on the latter. A road 2 miles in length over the Chobad Khind, rising 250 feet over a range of hills in the Máhim Táluka, is in progress.

54. **Surat and Broach.**—The road from Surat to Sachín was completed with the exception of a dip over the Bhedvad Khári. The hardening of the surface of the remaining four miles of the Broach and A'mod road has been completed. Nearly the whole of the earth-work and slab drains and culverts on the road from Surat to Bárdoli in British territory have been completed, and the larger bridges are in progress; it is in contemplation to run a light railway on this road up to Sanghar and Vyára.

55. **Kaira.**—The metalling of the roads from Godhra to Páli and from Dákor to Kapadvanj has been completed, the former road is to be taken over by the B. B. & C. I. Railway Company for the branch line lately sanctioned to Godhra. Earth and masonry works have been completed on the British and Báriya sections of the road from Godhra to Jhálod. The sections—Kaira to Naika, Vásna and Naika, and Vásna to Sábarmati River (aggregating 15 miles)—of one of the main traffic routes in Kaira, as also the railway feeder road connecting Nadiád and Mátar with the Kaira and Dholka road were completed and opened for traffic. The road from Nadiád to Mahudha, which is partly to be metalled with stone and partly with kankar, is in progress, and will be completed in the ensuing year 1881-82. The British section, 3½ miles, of the A'nand-Petlad road was completed with the exception of metalling. Good progress has been made on the road from Páli to Bálásinor, 8¼ miles, and considerable traffic has passed over it. Work in connection with a road from Bárejadi Railway Station to Naika, 1¼ miles long, intended to open up the country irrigated from the Khári River, was commenced lately, and will be pushed on in 1881-82, and the first portion of the road from Singpur to Jhálod has been nearly completed.

56. **Ahmedabad.**—Earth-work and three barrel drains were finished last year on the road from Sánand and Sárkhej to the Sábarmati Railway Station, but owing to the insufficiency of funds (Local) little progress was effected during the year.

57. **Ka'nara.**—The road from Sadáshivgad to Goa, 5 miles and 4 furlongs, has been improved and is passable for carts, except one nála or creek which is fordable at low tide. The Kárwár to Yellápur *vid* Kygaghát section of the Malapur-Haroor road with two masonry bridges, five small masonry drains, and four causeways, was in progress.

58. **Dha'rwa'r.**—The whole (11 miles) of the Navalgund-Annigeri road has been nearly completed; 4 miles of it having been fully embanked and moorumed. The British section of the road from Hubli to Kundgal, 2½ miles long, has been embanked the whole length. On the Annigeri section of the Dhárwár-Haliyál road, the metal which was collected in the past year has been spread and consolidated, and a further supply has been stored for spreading during the next rains. Earth-work has been done and moorum collected and spread on the portion of the Honávar and Samasji road between Alúr and Hávori. The work on the unfinished portion of Masur and Mundgeri road between Ránebennur and Godad Anveri was confined during the year to excavating catchwater drains, embanking, mooruming, rolling and kerbing. Similar work was done on the other section of the same road between Ránebennur and Halgeri. On the Nagasamudra and Kutmuchgi section of the road from Sirsi to Bádámi 11 drains have been completed, and the remaining ones and culverts are yet to be constructed; the moorum collected last year has been spread and the surface improved and rolled throughout. The improvement of four miles of road between Kotkondhunsi and Shirawad has been nearly completed.

59. **Belgaum and Kolha'pur.**—The road from Sankeshvar to Gad Hingláj has been completed, and improvements have been effected to the road from Hewarga to Tinai Ghát.

60. **Kala'dgi.**—About 11 miles of road from Bijápur to Sindgi between Chicksindgi and Hippargi have been improved.

61. **Ratna'giri.**—Rock, earth and boulder cutting have been continued on the A'mbághat road. A paved causeway across the Rone and a wooden bridge over the Kosumbe Rivers on the road known as the Mapral and Polalpur road will be completed before the commencement of the ensuing monsoon. The road is 16 miles in length, of which 14 miles are in Kolába and 2 in Ratnágiri, and connects the road system of the Deccan and Southern Marátha Country *vid* the Varanda and Fitzgerald Ghats with Mahapral on the Sávitri River accessible from Bánkot at all times of the tide.

62. **Sa'ta'ra.**—In this district the improvements of the following roads were still in progress:—(1) Wái-Shergaon and Shergaon-Khind, (2) Karád-Tásgaon and Peth-Sángli. Improvements have likewise been effected to Nahavighát and Mulharpeit-Pandharpur road.

63. **Poona District.**—A road from Khed to Bhímáshankar was commenced last year and is now near completion. The Málsej Ghát road was indifinitely postponed, but the survey of the line was in progress.

64. **Ahmednagar.**—The earth-works for the last 5 miles of the road between Rájuri and Bári were finished in 1880-81; the collection of moorum and spreading the same re-

mains to be done. A road 2½ miles in length from the town of Ráhuri to the Railway Station has been completed. Owing to sufficient funds not being available, only the masonry works on the Chikhli-Bheroba portion of the road from Sangamner to Kalas were constructed.

65. **Na'sik.**—Work on the Násik-Dindori and Kalvan road has been restricted this year to the 3rd section between Wuni and Iwat Bári, and ghát cutting and filling have been completed. On the Ubadha and Bárighát road all heavy cutting and filling along the line have been completed, and after the monsoon of 1881-82 the road will be ready for mooruming.

66. **Kha'ndesh.**—The Dhulia and Pimpalner road has advanced as far as Dhadva, 39 miles from Dhulia, where a deviation has been proposed to join the Dhulia and Surat road. The road from Sangir to Nandurbár has been completed. The work done during the year on the Jalgaon and Dharangaon road consisted of making embankments, cutting and excavating moorum.

## II.—BRIDGES.

67. **Northern Konkan.**—The masonry bridge over the Dáhánu creek, consisting of 3 spans of 30' each with segmental arches, has been completed and opened for traffic before the commencement of the rains.

68. **Ahmedabad.**—The Walla Darbár having offered to contribute the sum of Rs. 10,000 towards the construction of an iron bridge of 6 spans over the Utávly River at Walla, on the Gogha and Dhandhuka road, estimated to cost Rs. 10,111, the work has been given in contract and is now in progress.

69. **Ka'nara.**—A bridge, consisting of trussed wooden girders supported over masonry piers and having 4 spans of 37'6" each, has been commenced over the Birchi River. A similar structure of 2 spans of 20 feet each over the Yerkenbyle Nála on the Yellápur and Sirsi road has been completed.

70. **Dha'rwa'r.**—In the Dhárwár District the two bridges over the Deolee Nála on the Dhárwár and Tinai Ghát road, and over the Hulkoti Nála on the Kárwár and Bellary road, respectively, have been completed.

71. **Sa'ta'ra.**—The remaining 4 arches of the bridge over the Várna River near Kanegaon have been turned, and the bridge completed, with the exception of the cornice and parapet walls. In the south approach a bridge of 1 span of 40 feet has been completed. The old road is deviated to the site of the bridge, and the approach roads nearly finished. The Tarli and Vásna bridges have likewise been completed and opened for traffic.

72. **Kara'chi.**—The iron bridges over the Khara Phitto and the Goongra have been completed.

73. **Jacobabad.**—Ten culverts on the road between Jacobabad and Goránari, eight on the road from Jacobabad to Tangwáni, and twelve on the road from Thul to Garhi Hassan have been constructed during the year.

## IV.—ACCOMMODATION FOR TRAVELLERS.

74. **Kaira.**—Thirteen village chauris in the Kaira District and the rest-house for European officers near the Nadiád Railway Station have been completed.

75. **Kala'dgi.**—A dharmshála has been built at Hungund.

76. **Belgaum.**—One 1st-class dharmshála at Saundatti and two 2nd-class at Astoli and Yakkundi have been in progress.

## RAILWAY SURVEYS.

77. Expenditure of Rs. 3,735 (debited to Communications) and Rs. 18,588 (debited to Railways—Provincial), respectively, was incurred during the year under review for the survey of a line of railway from Barsi road to Pandharpur and the Bombay Eastern Deccan Railway; the progress made has been fully described in the Administration Report of the Railway Department.

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# V.—MISCELLANEOUS PUBLIC IMPROVEMENTS.

78. Under this head the total expenditure was Rs. 5,45,824, of which Rs. 3,28,028 was for Original Works, and Rs. 1,30,532 for Repairs; the balance being for Establishment (Rs. 82,954) and Tools and Plant (Rs. 4,370).

## I.—MUNICIPAL WORKS.

79. **Northern Konkan.**—A project for the supply of water to the town of Tanna, from the Pokran spring, 1¾ miles distant, was commenced in October 1880. The improvement of the water-supply of this town has been under consideration for several years, the present supply is very defective, being dependent on tanks and wells in the town, and is deficient in quantity and quality, and liable to fail towards the close of the hot weather. The scheme now under execution comprises a Reservoir at Pokran formed by an earthen dam 31½ feet in height and 1,020 feet in length, capable of holding nearly 27 millions of gallons, which is supplemented by the daily yield of 40,000 gallons from a spring, giving a total available supply, exclusive of loss by evaporation, &c., of 38 million gallons for 280 days equal to 8½ gallons per head for a population of 16,000 people. The water is to be conveyed from the Reservoir to the town by a cast-iron main 7″ diameter, and to be distributed by cast-iron branch pipes of suitable size to 8 hydrants in different parts of the town. One-half of the dam with puddle wall had been completed, the outlet trench excavated, and outlet pipe laid; two-thirds of the waste weir had also been cut and the pipes for main and distribution purchased and tested before the close of the year. The scheme is estimated to cost Rs. 78,564, of which Rs. 53,977 is to be met from Local, and the balance from Municipal, Funds.

80. **The water-supply in the old Bund Valley at Mátherán** being slightly under 5 gallons per head, which is insufficient for the increasing number of residents and visitors, it is being increased by the construction of a new masonry dam and retaining wall below the existing dams. The new dam is to be 38 feet in height and 250 feet in length at the top; the retaining wall which will run along the south side of the valley and will be backed with stone and earth will average 15 feet in height and be 417 feet in length. This dam and retaining wall will, it is calculated, impound 13,800,000 gallons of water equal to a supply of 35 gallons per head. The work was commenced on 25th December 1880, and by the 31st March 1881 the dam had been raised to a height of 12 feet and the retaining wall to a height of 3 feet and a large quantity of material collected. The estimated cost is Rs. 26,615, which is to be met by the station funds aided by a loan from Government.

81. **Surat.**—The works undertaken to check the erosive action of the River Tápti at Surat have been completed and proved most successful. The municipality contributed Rs. 4,076 towards the work which cost Rs. 20,059.

82. **Ahmedabad.**—The work in connection with water-supply to the Khárághoda Salt Works is now complete, the outlay having been Rs. 1,16,295. Compensation for the land taken up has not yet been fully paid.

83. **Kaira.**—The water-supply of this district has been improved by constructing wells at six different villages and on the Dakor and Kapadvanj road, of which one has been finished and the remainder are in progress. Improvements have also been undertaken of eleven tanks used for village water-supply in the same district, of which five have been finished and the others are in progress.

84. **Kala'dgi.**—The work of restoring the ancient water-works at Bijápur, known as the Begam Tank, was in progress and will be completed in the next year.

85. **Dha'rwa'r.**—The improvement of the tank at Chick Nargund has been completed.

86. **Belgaum.**—A well was being excavated at Sangrascope, Táluka Parasgad.

87. **Kha'ndesh.**—Two new wells are being constructed at Taloda and Bhátpur respectively, and the waste weir of the tank at Chadwell is being widened so as to prevent the water rising so high on the embankment as to endanger it.

88. **Shola'pur.**—The scheme for the supply of water to the town of Sholápur, which was commenced in November 1879, made great progress during the year, and was completed so far as to admit of water being supplied to the town on the 21st March 1881. The portions of the scheme completed during the year comprised the settling tank, steam pumps and machinery, main pipes with valves and all connections, and the high and low level service reservoirs. The engine-house and all works connected with the distribution in the town were nearly completed. The supply is to be pumped by steam from the Ekrúk Tank Canal. The estimated cost is Rs. 2,18,799, which has been met entirely by the municipality with the aid of a loan raised in the market.

89. **Sa'ta'ra.**—Another important water-supply scheme was commenced in January 1881 for the town of Sátára. The supply is at present derived from a spring on the Yeoteshwar hill above the town, from which a masonry conduit is laid down the Ghát to cisterns in various parts of the town. The minimum supply thus furnished is estimated at 3·35 gallons per head of population. The scheme now under execution comprises a storage reservoir at Khas on the plateau and a channel 12 miles in length, thence to the head of the old masonry aqueduct at Yeoteshwar. The Khas Reservoir will contain 52 millions of cubic feet, and will fill at least twice in the monsoon, the rain-fall being certain and reliable, that on the plains in the vicinity at 1,500 feet lower elevation being 75 inches.

The channel is to be partly in tunnel, partly of syphon pipes, and partly open. The works are estimated to give a supply (exclusive of the existing supply) of 27 gallons per head for a population of 40,000 people for 256 days. The scheme is to cost Rs. 3,01,466, and the funds have been provided from Municipal Funds aided by a loan in the market. During the year the tunnel line was marked out and excavation commenced. Twenty feet in length was completed, when, owing to the treacherous nature of the material, it gave way, and will have to be taken out in open excavation. It may still be found necessary to adopt another line in order to escape the tunnel. The work done consisted chiefly of collecting materials and marking out the proposed work.

## II.—HARBOUR IMPROVEMENTS.

90. **Karáchi Harbour Works.**—The Manora Break-water stood the south-west monsoon of 1880 without material injury, as it has now done for six successive monsoons. The opening of the centre joint for two short spaces in the length has not increased. Settlement still continues, especially, as before, on the outer half length, which settled an average of about 2 inches during the year. This, however, is as yet sufficiently high to break the sea, and will in time be raised by the gradual progress of the concrete capping. This was extended during the season 21 feet on the harbour side, half width, taking it to 813 feet from shore, and on the sea-side in a slanting form, to cover the open centre joint, for a length of 54 feet. Some breaches in the capping of the previous season were also made good, and 436 tons hand-rubble stone were thrown in, to strengthen the base on the sea-side, where the centre joint is open at 470 to 703 feet from shore.

91. The dredging of the harbour was for the third year carried on under the annual grant of one lákh, inclusive of establishments. 51,020 tons were dredged in rectification and some slight improvement of the entrance channel, and 135,150 tons within the harbour, of which 92,497 tons were dredged in rectifying and improving the outer berth of the deep water moorings for Her Majesty's troopships; 5,628 tons in the Manora anchorage; 15,817 tons in the east channel of the lower harbour; and 21,208 tons in the Keamari anchorage. The average cost of the dredging was 4¾ annas per ton, being a reduction on the rate of 7¼ annas of the previous year, but not so great as had been looked for by means of the new dredging fleet, and especially as the bulk of the dredging this year was within the harbour. The expenditure, exclusive of establishments, was Rs. 86,062, which included outlay on enlargement of the repairing dock and on the quarrying from Deep Water Point by the divers of 258 tons of stone, which was deposited in the west training groyne.

92. The new dredging plant, consisting of the dredger "Nearchus" and two steam Hopper barges, the arrival of which from England and progress of fitting up were recorded in the last year's report, were tried for the first time on 27th May with results not fully satisfactory; and shortly after a break-down took place in the circulating pump of the dredger, which caused some delay for repair, after which the vessels were unavoidably laid up during the height of the south-west monsoon, as the Hopper barges could not discharge out-side in the heavy sea without damage to their machinery. From 31st August the vessels were steadily employed, and have done and are doing a considerable amount of useful work, though by no means up to the specified standard of performance, especially as regards the dredger. The cost of the three vessels including spare gear has been Rs. 4,25,982, of which Rs. 4,23,706 was expended in England to date, and Rs. 1,376 in India in 1880-81.

93. The work of improvement of the new channel to the Native Jetty having been taken over by the Karáchi Harbour Board, need not here be referred to, further than to mention that a sum of Rs. 33,252 was sanctioned for the much-needed work of dredging the bar and extending the training groyne at the lower end of the channel just above Keamari, and Rs. 5,000 of this had been expended with good effect up to 31st March.

94. The work of the ship pier at Keamari having also been taken up by the Karáchi Harbour Board need not be alluded to here, further than to state that the contract for the work, exclusive of the small sum of Rs. 7,824 for dredging, was let on 13th July for Rs. 4,71,644, to Messrs. T. Cosser and Co., of Karáchi, who are bound to complete the work by 12th April 1882. The first stone of the abutment was laid by the Viceroy and Governor General of India, on 24th November 1879, and the work was given the name of the "Merewether Pier" in memory of the late Sir William Merewether, who so warmly forwarded the project, the great necessity for which has been so much felt of late years.

95. The renewal of the Commissariat pier at Keamari was also completed during the year, but the work was transferred to the Karáchi Harbour Board, who have repaid the cost, Rs. 15,973, to Government.

96. The usual harbour survey of January 1881 shows a continuance of improvement generally speaking, and especially in the east channel of the lower harbour, though at the same time pointing, as before, to the necessity of dredging for the maintenance and improvement of the entrance channel and lower anchorage,—a necessity which the removal of Deep Water Point and extension of the east pier would greatly diminish.



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97. Dredging is also required, and will soon be largely applied, for the restoration of the Keamari anchorage injured by deposit of a portion of the material scoured down from the new channel, the formation of which has given such valuable facilities to the trade of the port.

98. Some of Her Majesty's troopships visited the harbour on a few occasions during the year, but under orders from the Admiralty did not enter, though, except at extraordinarily low springs, they could have been berthed at the outer deep water mooring. They, however, met with no delay in discharging from the roads, where during the fair season, for, say, 8 months in the year, their work could proceed as easily as in the harbour, with only the disadvantage of an extra mile or so each way for the troop barges.

99. **Aden.**—With a view to afford landing points for passengers at all states of the tide and to serve at some future time as part of a retaining wall for reclamation, a tidal jetty was constructed at the landing pier at Steamer Point.

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